

# Primary Mouse Neuron Progenitor Cells

*Commonly used acronym: Mouse NPCs*

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## SCOPE OF THE METHOD

<b>The Method relates to</b>	Animal health
<b>The Method is situated in</b>	Basic Research
<b>Type of method</b>	In vitro - Ex vivo
<b>This method makes use of</b>	Animal derived cells / tissues / organs
<b>Species from which cells/tissues/organs are derived</b>	Mouse
<b>Type of cells/tissues/organs</b>	Cortical neuron progenitor cells from E15 embryo

## DESCRIPTION

### Method keywords

Neuron progenitor cells

NPC

mouse brain  
Cortex  
neuron differentiation

### **Scientific area keywords**

neurodevelopment  
neurodevelopmental disorders  
neuroscience  
neurobiology  
cellular proliferation

### **Method description**

We have developed a protocol for culturing primary neuron progenitor cells (NPCs) derived from mouse embryos at embryonic day 15 (E15). These cells are highly proliferative, can be subcultured and cryopreserved and can be differentiated to neurons or astrocytes. Hence, this method can greatly reduce the number of laboratory animals needed for the culture of primary neuronal cultures. They can be grown as adherent monolayers or as neurospheres.

The protocol consist of the following steps: Dissection of brain from mouse fetus at E15, separation of dorsal forebrain, dissociation into single cell suspension, culture onto poly-D-lysine coated vessels (for adherent cultures), subculturing, cryopreservation of cells, thawing of frozen cells, differentiation to neurons, maturation of differentiated neurons. The protocol is partially based on the protocol first described by Steven Pollard, Methods Mol Biol 2013.

### **Lab equipment**

- Dissection material
- Stereotactic microscope
- Horizontal flow cabinet

- Laminar flow cabinet
- Incubator

## **Method status**

Still in development

History of use

Internally validated

## **PROS, CONS & FUTURE POTENTIAL**

### **Advantages**

Possibility of subculturing and cryopreservation constitutes an almost unlimited source of primary cells that can be used for differentiation into neurons, thereby dramatically reducing the need for animals to generate primary neuron cultures. The cells are highly suitable for research on neurodevelopmental diseases which most often underlie defects in neuron progenitors, rather than neurons. The cells are also very suitable for genetic interference, e.g. via siRNA, CRISPR-Cas9 or lentiviral vectors.

### **Challenges**

The cells need specific growth media, which regularly needs to be prepared freshly and the medium should be changed every two days.

### **Modifications**

We have started from the method as described by Pollard, Methods Mol Biol 2013 which did not work for us. We have gradually tweaked this method and are still trying to improve it by making small modifications, although our current protocol is very robust.

## Future & Other applications

We currently have different cryopreserved cell lines from transgenic animals (e.g. Trp53 knockout) and cell lines that stably overexpress some of our genes of interest. Our research focuses on radiation-induced microcephaly but these cells could be applied as well for other neurodevelopmental disorders.

## REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION

### References

Mfossa et al., bioRxiv. 2020. doi: <https://doi.org/10.1101/2020.06.26.171132>. Not yet peer-reviewed.

### Associated documents

## PARTNERS AND COLLABORATIONS

### Organisation

**Name of the organisation** Belgian Nuclear Research Centre

**Department** Interdisciplinary Biosciences

**Country** Belgium

*Coordinated by*



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